

## CLAIMS

I claim:

1. A multifunctional base station comprising:

a transmit/receive switch;

at least one RF processing module, the at least one RF processing module being coupled to the transmit/receive switch;

5 an ultra high-speed transceiver, the ultra high-speed transceiver being coupled to the at least one RF processing module;

a codec module, the codec module being coupled to the ultra high-speed transceiver;

10 a signal processing module, the signal processing module being coupled to the codec;

a network interface, the network interface being coupled to the signal processing module;

15 wherein the transmit/receive switch receives an analog signal from an air interface of a wireless network, the analog signal having a spectrum extending from a first frequency to a second frequency, the first frequency being lower than the second frequency;

wherein an RF processing module has a band pass filter that passes the spectrum of the analog signal to the ultra high-speed transceiver;

20 wherein the ultra high-speed transceiver has at least one analog-to-digital converter for sampling the analog signal at least at twice the second frequency without the spectrum being shifted in frequency;

wherein the codec module adds at least one error code to the digital signal; and  
wherein the signal processing module passes the digital signal to the network interface.

2. The multifunctional base station of claim 1, further comprising:

a shifting module;

a separate RF processing module;

wherein the separate RF processing module is further coupled to the shifting  
5 module and the shifting module is coupled to the ultra high-speed transceiver;

wherein the transmit/receive switch further receives a separate analog signal from  
the air interface, the separate analog signal having a separate spectrum extending from a  
third frequency to a fourth frequency, the third frequency being higher than the second  
frequency and the fourth frequency being higher than the third frequency;

10 wherein the band pass filter of the RF processing module rejects the separate  
analog signal;

wherein the separate RF processing module has a separate band pass filter which  
passes the separate analog signal;

wherein the shifting module shifts the separate spectrum to a shifted separate  
15 spectrum, the shifted separate spectrum extending from a fifth frequency to a sixth  
frequency, the fifth frequency being lower than the third frequency and the sixth  
frequency being lower than the fourth frequency; and

wherein the at least one analog-to-digital converter samples the separate shifted spectrum of the separate analog signal at a separate sample rate of at least twice the sixth  
20 frequency.

3. The multifunctional base station of claim 2, wherein the shifting module comprises a down conversion module and an IF processing module.

4. The multifunctional base station of claim 1, wherein the at least one error code is selected from the group consisting of a Trellis code, an FEC code, and a CRC code.

5. The multifunctional base station of claim 1, wherein the signal processing module further suppresses a carrier wave of the analog signal and downsamples the digital signal.

6. The multifunctional base station of claim 1, wherein the analog signal is a fixed wireless signal.

7. The multifunctional base station of claim 1, wherein the analog signal is a cellular signal.

8. The multifunctional base station of claim 1, wherein the analog signal is a back haul signal.

9. A multifunctional base station comprising:

a network interface;

a signal processing module, the signal processing module being coupled to the network interface;

5 a codec module, the codec module being coupled to the network interface;

an ultra high-speed transceiver having at least one digital-to-analog converter, the ultra high-speed transceiver being coupled to the codec module;

at least one band pass filter, the at least one band pass filter being coupled to the ultra high-speed transceiver;

10 at least one up conversion module, the at least one up conversion module being coupled to the at least one band pass filter;

at least one amplifier, the at least one amplifier being coupled to the at least one up conversion module;

a transmit/receive switch, the transmit/receive switch being coupled to the at least

15 one amplifier;

wherein the network interface receives a digital signal from a digital network;

wherein the signal processing module passes the digital signal to the codec module;

wherein the codec module performs error detection on the digital signal;

20 wherein the ultra high-speed transceiver passes the digital signal to one of the at least one digital-to-analog converter, the digital signal being passed to the at least one analog-to-digital converter based on a pattern of bits in the digital signal that identifies an

analog transmission protocol for an analog signal to be transmitted by the multifunctional base station;

25 wherein the at least one digital-to-analog converter of the ultra high-speed transceiver converts the digital signal to the analog signal;

wherein the at least one band pass filter module has at least one band pass filter for passing the analog signal;

30 wherein the up conversion module shifts a spectrum of the analog signal passed by the at least one band pass filter, the spectrum being shifted to a carrier frequency,

wherein the at least one amplifier amplifies the analog signal and modulates a carrier wave onto the analog signal; and

wherein the transmit/receive switch outputs the analog signal at an antenna.

10. The multifunctional base station of claim 9, wherein the at least one error code is selected from the group consisting of a Trellis code, FEC code, and a CRC code.

11. The multifunctional base station of claim 9, wherein the analog transmission protocol selected from the group consisting of CDMA, IS-95, IS-2000, QAM, and QPSK.

12. The multifunctional base station of claim 9, wherein the analog signal is a fixed wireless signal.

13. The multifunctional base station of claim 9, wherein the analog signal is a cellular signal.

14. The multifunctional base station of claim 9, wherein the analog signal is a back haul signal.

15. The multifunctional base station of claim 9, wherein the signal processing module adds the pattern of bits in the digital signal to identify the analog transmission protocol.

16. A method for processing an analog signal on a base station, the method comprising:

receiving the analog signal from an air interface of a wireless network, the analog signal having a spectrum extending from a first frequency to a second frequency, the first frequency being lower than the second frequency;

passing the spectrum of the analog signal through a band pass filter of an RF processing module to the ultra high-speed transceiver;

sampling the analog signal at least at twice the second frequency, the analog signal being sampled by an analog-to-digital converter of the ultra high-speed transceiver

without the spectrum being shifted in frequency;

adding at least one error code into the digital signal at a codec module;

passing the digital signal through a signal processing module; and

outputting the digital signal at a network interface.

17. The method of claim 16, wherein passing the digital signal through the signal processing module comprises suppressing a carrier wave of the analog signal and downsampling the digital signal.

18. The method of claim 16 wherein the at least one error code is selected from the group consisting of a Trellis code, FEC code, and a CRC code.

19. The method of claim 16, further comprising:

receiving a separate analog signal from the transmit/receive switch, the separate analog signal having a separate spectrum extending from a third frequency to a fourth frequency, the third frequency being higher than the second frequency and the fourth frequency being higher than the third frequency;

rejecting the separate analog signal at the band pass filter of the RF processing module;

passing the separate analog signal at a separate band pass filter of a separate RF processing module;

shifting the separate spectrum to a shifted separate spectrum, the shifted separate spectrum extending from a fifth frequency to a sixth frequency, the fifth frequency being lower than the third frequency and the sixth frequency being lower than the fourth frequency; and

sampling the separate shifted spectrum of the separate analog signal at the at least  
15 one analog-to-digital converter of the ultra high-speed transceiver, the analog signal  
being sampled at a sample rate of at least twice the sixth frequency.

20. A method for processing a digital signal on a base station, the method  
comprising:

receiving a digital signal at a network interface;  
passing the digital signal through a signal processing module;  
5 performing error detection on the digital signal at a codec;  
making a determination of an analog transmission protocol for an analog signal to  
be transmitted by the base station, the analog transmission protocol being identified by a  
pattern of bits in the digital signal;  
passing the digital signal to at least one digital-to-analog converter based on the  
10 determination of the analog transmission protocol;  
converting the digital signal to an analog signal by the at least one digital-to-  
analog converter;  
passing the analog signal to an up conversion module;  
shifting a spectrum of the analog signal to a carrier frequency at the up conversion  
15 module;  
amplifying the analog signal at an amplifier;  
modulating a carrier wave onto the analog signal; and  
outputting the analog signal at a transmit/receive switch.



21. The method of claim 20, wherein the analog transmission protocol is selected from the group consisting of CDMA, IS-95, IS-2000, QAM, and QPSK.

22. The method of claim 20, wherein the at least one error code is selected from the group consisting of a Trellis code, FEC code, and a CRC code.

23. The method of claim 20, further comprising inserting the pattern of bits that identifies the analog transmission protocol into the digital signal, the pattern of bits being inserted at the signal processing module.